

Claims

1. A device for regulating at least one register and a color density in a printing press having at least one printing group (01, 02, 03, 04) with at least one forme cylinder (06, 07, 08, 09), one transfer cylinder (11, 12, 13, 14) and one counter-pressure cylinder (16, 17, 18, 19), wherein an image sensor (22) records an image of an imprinting substrate (21) which has been imprinted in color in the printing group (01, 02, 03, 04) and transmits data correlated with the image to an evaluating unit (23), wherein the evaluating unit (23) generates an actuating command to an actuating drive mechanism for regulating the ink supply from a comparison of the data from an image actually recorded during the running production of the printing press with data from a previously generated image, characterized in that the evaluating unit (23) generates an actuating command to a drive mechanism for regulating the supply of ink and an actuating command to a drive mechanism for regulating the register from the data correlated with the image recorded of the imprinted imprinting substrate (21), wherein the forme cylinder (06, 07, 08, 09) has a drive mechanism which can be controlled or regulated separately from the counter-pressure cylinder (16, 17, 18, 19) assigned to it.

2. The device in accordance with claim 1, characterized in that the image sensor (22) is directed onto the imprinting substrate (21) and with its recording covers

the entire width of the imprinted imprinting substrate (21) extending transversely to the transport direction.

3. A device for regulating at least one register and a color density in a printing press having at least one printing group (01, 02, 03, 04) with at least one forme cylinder (06, 07, 08, 09), one transfer cylinder (11, 12, 13, 14) and one counter-pressure cylinder (16, 17, 18, 19), wherein an image sensor (22) records an image of an imprinting substrate (21) which has been imprinted in color in the printing group (01, 02, 03, 04) and transmits data correlated with the image to an evaluating unit (23), wherein the evaluating unit (23) generates an actuating command to an actuating drive mechanism for regulating the ink supply from a comparison of the data from an image actually recorded during the running production of the printing press with data from a previously generated image, characterized in that the image sensor (22) is directed onto the imprinting substrate (21) and with its recording covers the entire width of the imprinted imprinting substrate (21) extending transversely to the transport direction, wherein the evaluating unit (23) generates the actuating command for regulating the supply of ink and an actuating command to a drive mechanism for regulating the register from data correlated with the image recorded over the entire width of the imprinted imprinting substrate (21).

4. The device in accordance with claim 3, characterized in that the forme cylinder (06, 07, 08, 09) has a drive mechanism which can be controlled or regulated

separately from the counter-pressure cylinder (16, 17, 18, 19) assigned to it.

5. A device for regulating at least one register in a printing press having at least one printing group (01, 02, 03, 04) with at least one forme cylinder (06, 07, 08, 09), one transfer cylinder (11, 12, 13, 14) and one counter-pressure cylinder (16, 17, 18, 19), wherein an image sensor (22) records an image of an imprinting substrate (21) which has been imprinted in color in the printing group (01, 02, 03, 04) and evaluates the image in an evaluating unit (23), wherein the evaluating unit (23) generates an actuating command to an actuating drive mechanism for regulating the register, wherein the forme cylinder (06, 07, 08, 09) has a drive mechanism which can be controlled or regulated separately from the counter-pressure cylinder (16, 17, 18, 19) assigned to it, characterized in that the actuating unit (23) generates the actuating command to the actuating drive mechanism for regulating the register from a comparison of the data correlated with an image actually recorded during the running production of the printing press with data from a previously generated image.

6. The device in accordance with claim 5, characterized in that the actuating unit (23) generates an actuating command to the actuating drive mechanism for regulating the supply of ink from a comparison of the data of the image actually recorded during the running production of the printing press with data from the previously generated image.

7. The device in accordance with claim 5, characterized in that the image sensor (22) is directed onto the imprinting substrate (21).

8. The device in accordance with claim 5, characterized in that with its recording the image sensor (22) covers the entire width of the imprinted imprinting substrate (21) extending transversely to the transport direction.

9. The device in accordance with claim 1, 3 or 5, characterized in that the actuating unit (23) generates an actuating command to the actuating drive mechanism for regulating the supply of a dampening agent from a comparison of the data of the image actually recorded during the running production of the printing press with data from the previously generated image.

10. The device in accordance with claim 1, 3 or 5, characterized in that the register is a circumferential register, a lateral register, or a diagonal shifting device for the forme cylinder (06, 07, 08, 09) in respect to the transfer cylinder (11, 12, 13, 14) assigned to it.

11. The device in accordance with claim 1, 4 or 5, characterized in that, by means of its actuating command to the drive mechanism for regulating the register, the actuating device (23) controls or regulates a phase relation or an angular relation of the forme cylinder (06, 07, 08, 09).

12. The device in accordance with claim 1, 3 or 5, characterized in that the actuating drive mechanisms of the printing press are connected to a data network which is connected with the evaluating unit (23).

13. The device in accordance with claim 1, 3 or 5, characterized in that the evaluating unit (23) has a connector (36) to a company network.

14. The device in accordance with claim 1, 3 or 5, characterized in that the evaluating unit is in a bi-directional data exchange with an input and output unit (33), wherein the input and output unit (33) provides correction options for the actuating commands generated by the evaluating unit (23) based on the possibility of manual input and/or triggering of at least one actuating command.

15. The device in accordance with claim 14, characterized in that the input and output unit (33) has a monitor for displaying the recorded image.

16. The device in accordance with claim 1, 3 or 5, characterized in that the evaluating unit (23) has a memory device (34) for storing recorded image sequences.

17. The device in accordance with claim 1, 3 or 5, characterized in that the printing press applies at least one printed image to the imprinting substrate (21).

18. The device in accordance with claim 1, 3 or 5, characterized in that the regulation takes place simultaneously with an inspection of the printed image.

19. The device in accordance with claim 1, 3 or 5, characterized in that the image sensor (22) is arranged at the outlet of the printing group (04) of the printing press which is last in the transport direction of the imprinting substrate (21).

20. The device in accordance with claim 1, 3 or 5, characterized in that the image sensor (22) is arranged in or at a delivery device (28) of the printing press.

21. The device in accordance with claim 1, 3 or 5, characterized in that the evaluating unit (23) performs its check of a shading change and/or its check of maintaining the registration continuously during the running printing process.

22. The device in accordance with claim 1, 3 or 5, characterized in that the evaluating unit (23) performs its check of a shading change and/or its check of maintaining the registration for each printed copy imprinted in the printing press.

23. The device in accordance with claim 1, 3 or 5, characterized in that the evaluating unit (23) classifies checked printed copies into groups of different quality stages.

24. The device in accordance with claim 1, 3 or 5, characterized in that evaluating unit (23) stores data for logging and simultaneous documentation of the quality of the printed products and/or for statistical analyses of the printing process.

25. The device in accordance with claim 1, 3 or 5, characterized in that, in connection with a printed copy whose regulating deviation exceeds a permissible tolerance limit, the evaluating unit (23) issues an actuating command to an actuating drive mechanism acting on at least one arrangement for transporting the imprinting substrate (21) for removing and/or marking this printed copy.

26. The device in accordance with claim 1, 3 or 5, characterized in that an angle encoder (32) for synchronizing the frequency at which the recording of images takes place with the transport speed of the imprinting substrate (21) is installed at least in one printing group (01, 02, 03, 04).

27. The device in accordance with claim 26, characterized in that the angle encoder (32) is installed in that printing group (01, 02, 03, 04), in or at which the recording of the images by means of the image sensors (22) takes place.

28. The device in accordance with claim 26, characterized in that the angle encoder (32) transmits its output signal to the evaluating unit (23) and/or the image sensor (22).

29. The device in accordance with claim 1, 3 or 6, characterized in that, in case of a shading change exceeding a permissible tolerance limit, the evaluating unit (23) changes the metering and/or supply of ink to the printing press in such a way that the shading change becomes minimal because of the application of ink following the actually checked image.

30. The device in accordance with claim 1, 3 or 5, characterized in that the evaluating unit (23) changes at least one register which can be adjusted in the printing press in such a way that the greatest possible registration accuracy results for a printed image which follows the evaluated image.

31. The device in accordance with claim 1, 3 or 5, characterized in that the data of the previously generated image are correlated with an image recorded by the image sensor (22).

32. The device in accordance with claim 1, 3 or 5, characterized in that the data of the previously generated image are correlated with an image created in a pre-printing stage which is arranged upstream of the printing press.

33. The device in accordance with claim 32, characterized in that a data processing device of the pre-printing stage is connected with the evaluating unit (23), wherein the data processing device transmits the data of the previously generated image to the evaluating device (23).

34. The device in accordance with claim 1, 4 or 5, characterized in that the printing press has several printing groups (01, 02, 03, 04), wherein in at least one of the printing groups (01, 02, 03, 04) of the printing press the drive mechanism of the forme cylinder (06, 07, 08, 09) or of the transfer cylinder (11, 12, 13, 14) assigned to this forme cylinder (06, 07, 08, 09) can be controlled or regulated independently of the drive mechanism of the forme cylinder (06, 07, 08, 09) or of the transfer cylinder (11, 12, 13, 14) assigned to this forme cylinder (06, 07, 08, 09) in another printing group (01, 02, 03, 04) of the printing press.

35. The device in accordance with claim 34, characterized in that by means of the actuating command issued by it, the evaluating unit (23) sets the mutual angular relation or phase relation of the forme cylinders (06, 07, 08, 09) which are involved in the printing of the printed image and are arranged in different printing groups (01, 02, 03, 04) of the printing press, or of their assigned transfer cylinders (11, 12, 13, 14), to a registration suitable for creating the printed image.

36. The device in accordance with claim 1, 4 or 5, characterized in that the drive mechanism of the forme cylinder (06, 07, 08, 09) is arranged coaxially with the shaft of the forme cylinder (06, 07, 08, 09).

37. The device in accordance with claim 1, 4 or 5, characterized in that the drive mechanism of the forme

cylinder (06, 07, 08, 09) is rigidly connected with the shaft of the forme cylinder (06, 07, 08, 09).

38. The device in accordance with claim 1, 4 or 5, characterized in that the printing press has several printing groups (01, 02, 03, 04), wherein the counter-pressure cylinders (16, 17, 18, 19) arranged in different printing groups (01, 02, 03, 04) of the printing press are mechanically connected with each other.

39. The device in accordance with claim 38, characterized in that counter-pressure cylinders (16, 17, 18, 19) arranged in different printing groups (01, 02, 03, 04) of the printing press have a common drive mechanism.

40. The device in accordance with claim 38, characterized in that the drive mechanism of the counter-pressure cylinders (16, 17, 18, 19) is disconnected from the drive mechanism of the forme cylinders (06, 07, 08, 09) or the transfer cylinders (11, 12, 13, 14).

41. The device in accordance with claim 1, 4 or 5, characterized in that the forme cylinder (06, 07, 08, 09) and the transfer cylinder (11, 12, 13, 14) assigned to it have a common drive mechanism.

42. The device in accordance with claim 1, 3 or 5, characterized in that the evaluating unit (23) performs the separation of the image into color separations (CMYK) from the data of its actually recorded image.

43. The device in accordance with claim 1, 3 or 5, characterized in that the evaluating unit (23) performs an analysis of suitable portions of the printed image from the data of the previously generated image.

44. The device in accordance with claim 43, characterized in that suitable portions of the printed image are areas of the image in which the color to be measured dominates or appears exclusively.

45. The device in accordance with claim 43, characterized in that the evaluating unit (23) determines the position of the individual color components within the suitable portions of the printed image.

46. The device in accordance with claim 42 and 45, characterized in that the evaluating unit (23) performs a relative position determination of a color separation provided by the data of the actually recorded image in relation to a reference color separation performed from the data of the previously generated image.

47. The device in accordance with claim 46, characterized in that the evaluating unit (23) performs the relative position determination by means of a correlation method.

48. The device in accordance with claim 46, characterized in that the evaluating unit (23) performs the

relative position determination by means of a cross-correlation method.

49. The device in accordance with claim 46, characterized in that the evaluating unit (23) performs the relative position determination of an actually recorded image several times.

50. The device in accordance with claim 46, characterized in that the evaluating unit (23) performs the relative position determination in the transport direction of the imprinting substrate (21) and/or transversely in respect to the transport direction of the imprinting substrate (21).

51. The device in accordance with claim 50, characterized in that the evaluating unit (23) converts position differences, detected by relative position determination, between the color separation provided from the data of the actually recorded image and the reference color separation from the data of the previously generated image in the transport direction of the imprinting substrate (21) and/or transversely in respect to the transport direction of the imprinting substrate (21), into at least one actuating command.

52. The device in accordance with claim 1, 3 or 5, characterized in that, for a special color different from the standard colors (CMYK), the evaluating unit (23) evaluates special suitable portions of the printed images.

53. The device in accordance with claim 43, characterized in that the evaluating unit (23) stores the suitable portions of the printed image in the memory device (34).

54. The device in accordance with claim 53, characterized in that the evaluating position sets the portions of the printed image stored in the memory device (34) as a desired position.